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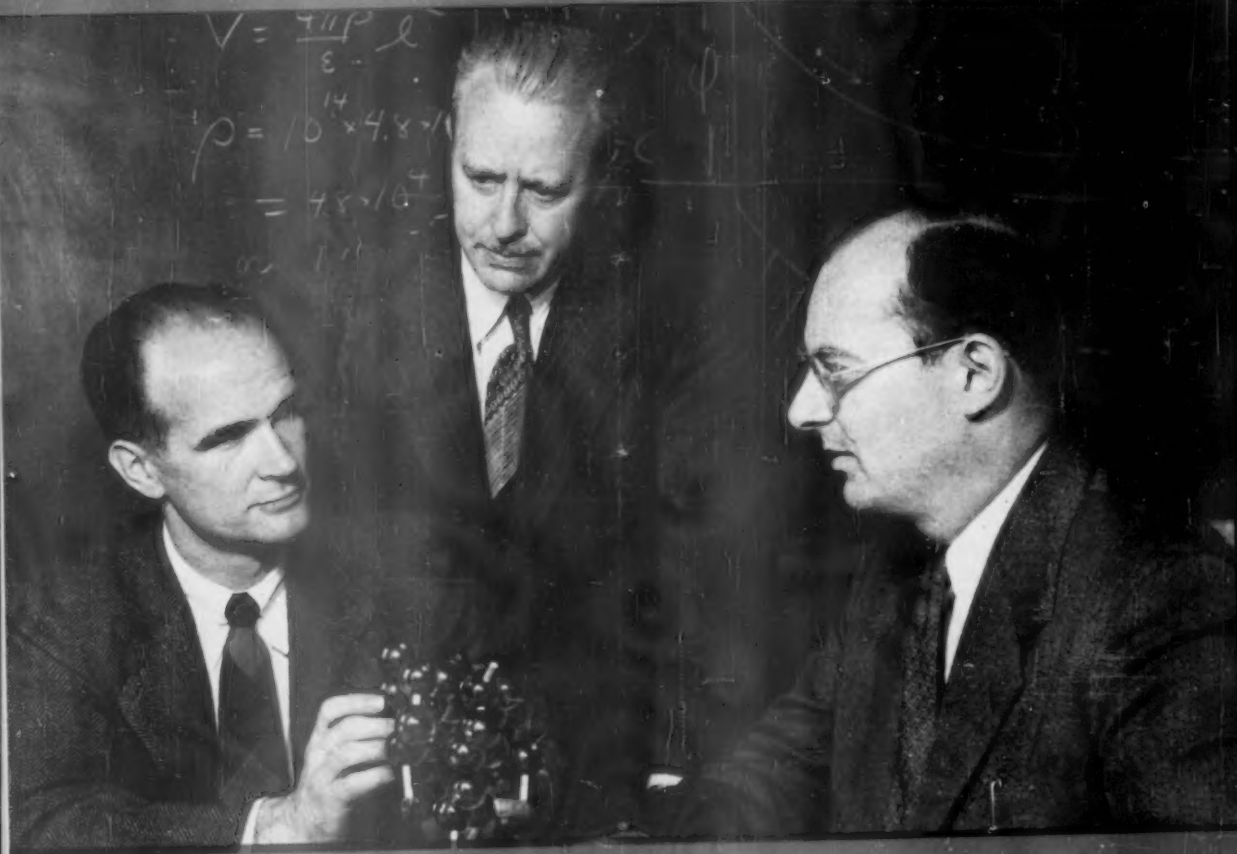
November 10, 1956

VOL. 70, NO. 19

PAGES 289-304

# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Physics Nobelists

See Page 291

A SCIENCE SERVICE PUBLICATION

## Kodak reports to laboratories on:

how to draw a crowd into a tent... a material to coat a pattern on metal... a pair of replacements for the orchard grass around the old apple tree

### Slowdown in color

In the heat of debate we once heard an advertising man cry out, "What's a product? Anybody can make a product. The real art is selling a product."

Though since moved on to fields where his artistry could more lushly flower, he wasn't entirely wrong, just too sweeping in his value judgments. In the market place—particularly in the industrial market place—many a wonderfully ingenious and efficient product of the engineering mind and hand fails to ring the bell as loud and clear as expected, simply because too few potential customers know how the thing works. One way to draw a crowd into the tent for educational purposes is to show them movies. Showmanship isn't all; some mechanisms can be seen at work in no other way than through movies which slow down the action fifty times or more. Sometimes recognition of this is all the showmanship needed.

There was a time when these high speed movies were used only for development and trouble-shooting. Long miles of high speed film still quite justify themselves in the form of black-and-white rush negatives shown once to taut little engineering groups, but more and more high speed shooting is done on *Kodachrome Film* and even on *Commercial Kodachrome Film*, which is chosen only with advance knowledge that numbers of full-color copies will be required for circulation.

"*High Speed Motion Pictures*," a new booklet obtainable from *Eastman Kodak Company, Sensitized Goods Division, Rochester 4, N. Y.*, tells about the Kodak High Speed Camera and about the films spooled for this kind of movie making.

### Mr. Gabler beats the glue

You should see what a fine job Bob Gabler has been doing lately in converting the steel industry over to

*Kodak Photo Resist*. Who is Bob Gabler? A man we keep in Pittsburgh to help work out any photographic ideas that come up in the various industries there. What is *Kodak Photo Resist*? A liquid which quickly hardens to a tough, tenacious coating on metal, but only in areas where bright light has hit it before flushing with a certain solvent called *Kodak Photo Resist Developer*.

Before Mr. Gabler showed *Kodak Photo Resist* to the men who make the tensile measurements on sheet steel, they had mostly been using old-fashioned bichromated glue as the light-sensitive substance for photographically printing a measurement grid onto their samples before deformation. Bichromated glue is not nearly as light-sensitive as *Kodak Photo Resist*, but more annoying to the steel testers is its tendency to flake off in the test instead of stretching with the metal the way a grid pattern of *Kodak Photo Resist* does. Bob, of course, had no way of knowing in advance that *Kodak Photo Resist* would work out so well, since the product is one we thought we were making merely for photoengravers, photolithographers, and electronic-circuit printers. But when the steelmen called, he went in there pitching and everything turned out OK. That's what we pay him for.

If you have a problem for a *Kodak Technical Representative* like Bob Gabler or if you just want literature on *Kodak Photo Resist*, write *Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N. Y.*

### Chicken economics

Even if your only relationship with chickens is to enjoy them fried or roasted, chicken economics is more interesting than you might think. No longer is the chicken the symbol of dietary luxury that it used to be when chickens lived on the crude scratch feed that the farmer's wife

threw them. Maybe the chicken is no healthier today than it was then, but the chicken business is healthier, and people can afford to eat its product on weekdays.

When the ratio of pounds of feed to pounds of marketable chicken is carried to two decimal places (as the ag schools do in teaching that new folkway, cost accounting), little room is left in the feed bag for certain protective substances that the chickens' free-running ancestors used to get from the orchard grass around the old apple tree. Such things the chemical industry now provides. Poets of pastoral bent may rankle, but certainly not the people who make the machines that cut the gears that go into the automatic transmissions that drive the station wagons that successful farmers now buy. And chicken sandwiches taste better than ever.

As part of the chemical industry, we not only make real vitamin E for feed manufacturers in a form more than 200 times as concentrated as found in dried orchard grass, but now we have launched *Tenox BHT, Agricultural Grade* to preserve and extend whatever vitamin A and vitamin E are already present in natural feed materials. This butylated hydroxytoluene has emerged victorious as a chemical anti-oxidant of unassailable safety even in human food. Now it is for the feedmen, the poultry growers, and their academic advisors to decide merely how much protection from what business risks is worth how much cash outlay.

Myvamax Vitamin E Feed Supplement, commercial data about it, and a spate of scientific literature are obtainable from *Distillation Products Industries, Rochester 3, N. Y.* (Division of *Eastman Kodak Company*). *Tenox BHT, Agricultural Grade*, in the form of free-flowing, non-dusting granules of a particle size to assure rapid, permanent blending is now on sale by *Eastman Chemical Products, Inc., Kingsport, Tenn.* (Subsidiary of *Eastman Kodak Company*).

This is one of a series of reports on the many products and services with which the Eastman Kodak Company and its divisions are... serving laboratories everywhere

Kodak  
TRADE MARK

## GENERAL SCIENCE

# Nobel Prize Winners

Award in chemistry shared jointly by an English and a Russian scientist for studies of chemical reactions; physics prize shared by three Americans for transistor research.

## See Front Cover

➤ ONE of industry's tiniest devices earned its three American developers one of science's biggest awards.

The Nobel Prize in Physics for 1956 has been awarded to Drs. John Bardeen of Champaign, Ill., Walter Brattain of Murray Hill, N. J., and William Shockley of Mountain View, Calif., for having invented and developed the transistor.

A very small electronic gadget, the transistor has revolutionized the radio and telephone industry and already become a household word in this country. In the short time since its development in 1948, the transistor has found its way into use in everything from portable radios to earth satellites.

The prize-winning development was made by the three scientists eight years ago when they were working at the Bell Telephone Laboratories.

Drs. Bardeen, Shockley and Brattain were studying semi-conductors, materials that take on the properties of both metals and insulators, depending upon the way in which they are treated.

In the study, Drs. Bardeen and Brattain found that two contacts on the semi-conductor surfaces and a connection to a germanium crystal resulted in the arrangement being an amplifier that acts very much like the larger triode vacuum tube. Since that time, transistors have replaced the vacuum tube in hundreds of electronic uses.

Made of germanium and silicon and, experimentally, of other rare metals, the transistor's small size and low power requirements make it an electronic engineer's dream gadget.

New uses for it are being found almost every other day.

Scientists trying to explain about what makes semi-conductors work talk not only about the electrons that conduct electricity, but "holes" where electrons have been and then left. Since electrons are difficult to visualize, picturing the holes that are where they were seems almost to defy the imagination.

The three American scientists who jointly shared in this year's Nobel Prize in Physics will split the \$38,633 in prize money, which will be presented in December.

They are shown in the photograph on the cover of this week's SCIENCE NEWS LETTER discussing the crystal structure of semi-conductors. On the left is Dr. Shockley, Dr. Brattain is in the center and Dr. Bardeen is on the right.

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➤ THE SEEMINGLY SIMPLE REACTION of hydrogen and oxygen to form water was studied in great detail by the two scientists who were jointly awarded this year's Nobel Prize in Chemistry.

Sir Cyril N. Hinshelwood, Lee's professor of chemistry at the University of Oxford, England, and Prof. Nikolai N. Semenov, founder and permanent director of the Institute of Chemical Physics, Moscow, have investigated the various ways in which oxygen and hydrogen can combine. They have also studied the energy released by the different reactions.

Hydrogen and oxygen can combine in proportions other than the familiar  $H_2O$ . These other compounds exist for a short time and lead to other reactions.

The interaction of hydrogen and oxygen can proceed in many ways. At ordinary temperatures, they combine when illuminated with sunlight. This is a chain reaction fundamental to photosynthesis. A number of energy changes take place one after another, the results being much greater than if the reaction had taken place in one step.

When hydrogen and oxygen react between 500 and 600 degrees Centigrade, they ignite. If the pressure is then lowered, they explode.



**NOBELIST IN CHEMISTRY**—Sir Cyril N. Hinshelwood, who shares with Prof. Nikolai N. Semenov the 1956 Nobel Prize in Chemistry, is shown in the photograph.

The reaction of the two gases is very sensitive to catalysts, chemicals that speed reactions although remaining unchanged themselves.

Science News Letter, November 10, 1956

## TECHNOLOGY

## Special Mirror Cuts X-Ray Danger to Patient

➤ HAVING AN X-RAY picture taken can be safer than ever, thanks to a mirror. With its aid, exposure of the patient to X-rays can be reduced 70% to 75%.

The mirror is the special feature of the new type of small-film chest X-ray machine developed by the X-ray department of General Electric Company, Milwaukee, Wis. The camera portion of the unit is produced by the Fairchild Camera & Instrument Corporation, Jamaica, N. Y.

The special mirror applies the same principle used by astronomers to photograph light from the distant stars. The reduction in X-ray exposure is made possible by the mirror's optical speed, which is between four and five times greater than that of refractive lens-type photo-roentgen cameras hitherto used in chest X-ray surveys.

The large-diameter mirror system, similar to those for large telescopes, is also said to produce sharper and clearer images than have hitherto been possible.

The new camera was developed by Fairchild in cooperation with the N. V. Optische Industrie (Odelca) of the Netherlands.

Unlike the conventional chest X-ray camera, the Fairchild-Odelca camera places the X-ray film between the fluorescent screen and the mirror-lens. The image of the chest thus travels first through the camera, passing the film on all sides, and then strikes the curved precision mirror at the rear, where the light is gathered and focused sharply and reflected back on to the film.

Because of its greater speed, the new X-ray camera helps cut down on re-takes caused by voluntary or involuntary motion on the part of the patient.

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## ANIMAL NUTRITION

## Eggs Give Biggest Food Research Puzzle

➤ THE HOUSEWIFE who worries over the price of a dozen eggs has nothing on the farmer and agricultural scientist.

They wonder why it takes almost seven pounds of feed for hens to produce a dozen eggs, when it should take only five pounds.

This "big puzzle" was stressed by Byron T. Shaw, administrator of the U. S. Department of Agriculture's Agricultural Research Service, at the meeting of the Animal Nutrition Research Council in Washington.

Farmers now need to feed less than 15 years ago to get a pound of weight gain on broilers, beef cattle, hogs and turkeys and for milk production. Improved laying rations, however, have not increased egg production as they should have.

Science News Letter, November 10, 1956

## CARDIOLOGY

# Record Heart's Current

► **BETTER RECORDS** of the heart's electrical currents and therefore better knowledge of its state of health or disease are coming from new techniques reported at the American Heart Association meeting in Cincinnati.

Some of the distortions caused by tissues through which the current must pass en route from the heart to the body surface where it is recorded are eliminated by vectorcardiographic techniques reported by Dr. George E. Seiden of the University of Pennsylvania, Philadelphia.

This variation of electrocardiography records the heart's electricity simultaneously not only from the front but also from the sides.

This "three-dimensional" picture is transmitted in the form of loops or vectors, rather than on a straight-line graph. Because a greater area of the chest is reached at one time, some authorities consider that the vectorcardiogram provides more information than standard electrocardiographic tracings.

Dr. Seiden has added a "resolver" to the vectorcardiographic apparatus. This device turns the loops around until the greatest

possible surface can be observed. Thus, more data become available and new mathematical devices can be employed in interpretation.

Another major distortion is caused by the fact that the blood in the heart is a much better conductor of electrical currents than the heart muscle. As a result, some of the heart's current is "short-circuited" before it reaches the surface.

The loss in voltage by the time the heart's currents reach the surface of the chest is about 25% in the normal heart, Dr. Clifford V. Nelson of Portland, Me., estimates.

In hearts enlarged by disease, the current travels through a greater volume of blood and the voltage loss is higher.

Dr. Nelson made his discoveries in studies on animal hearts made while he was at the University of Utah. These experiments were aimed at measuring the amount of current lost because of short-circuiting by the blood. Different fluids of known electrical conductivity were substituted for the blood in the heart chambers while the electrical activity of the heart was studied.

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## METEOROLOGY

# Major Drought Hits U.S.

► **THE DROUGHT** in the U. S. mid-section had reached "major proportions" by Sept. 30, end of the "water year," the U. S. Geological Survey reports.

Ground-water levels generally were below average in the South, the Southwest and most of the mid-continent area, according to the annual summary of water resources. In many wells in these areas record low levels were reached.

Water levels were about average or above in the Great Lakes area, the Northwest and the Northeast.

"Disastrous" floods hit California and Oregon during the year covered by the report. Those occurring in Connecticut and New York were "destructive." Floods hitting Nova Scotia and the Columbia River Basin were "outstanding."

Annual runoff of Columbia River was the highest since 1894, and flows of Fraser, Ohio and St. Lawrence Rivers were also above normal. The Mississippi and Missouri Rivers carried less water than normal. Flow of the Colorado River was "deficient."

Runoff of water over the United States was deficient over about 40% of the country, the largest area since 1934.

This 40% figure, according to the annual summary, reflects the spreading drought in southern United States that in some areas has become "quite serious."

The area of excessive runoff, although

small, was still about five times as large as in the 1955 water year. There was no area of deficient runoff in the Northwest but, in the southern half of the country, runoff was excessive only in parts of California and Nevada.

There was no extra runoff in any month of the year at any of the key gage stations reporting in North Carolina, South Carolina, Georgia, Iowa, Nebraska, Kansas and Colorado.

In Canada, runoff was somewhat less than in the 1956 water year than in 1955. Areas of deficient runoff were in eastern Canada and northwestern British Columbia.

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## GEOPHYSICS

# "Dawn Chorus" Heard in Two Places at Same Time

► **THE "DAWN CHORUS,"** radio noise that sounds like a rookery heard from a distance, occurs simultaneously at two stations 360 miles apart, two New Zealand scientists report.

The many whistles of the "dawn chorus" are heard most frequently in the early hours of the morning at a rate of one rising tone every few seconds.

The occurrence of these audible noises in the radio frequency range is related to magnetic activity, but there is as yet

no theory to account for their production or propagation.

Occasionally a "burst" of the dawn chorus occurs, during which the rate of rising whistles has a "sudden and spectacular increase."

The audible tones then often overlap, G. McK. Alcock of the Dominion Physical Laboratory, Lower Hutt, and L. H. Martin of the New Zealand Broadcasting Service, Dunedin, report in *Nature* (Oct. 27).

The two stations at which the simultaneous occurrence of the dawn chorus was recorded were Wellington and Dunedin, New Zealand.

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## BIOCHEMISTRY

# Isolate Growth Hormone

**Human and monkey hormone molecules promoting growth isolated for first time. Consisting of about 240 amino acids, they are nearly half the size of the cattle hormone.**

► HUMAN and monkey pituitary growth hormones have been isolated for the first time, stimulating renewed hope this important secretion eventually may be available for the treatment of human disease.

The achievement was reported to the American Cancer Society meeting in New York by Dr. C. H. Li, director of the University of California Hormone Research Laboratory.

The human and monkey hormone molecules appear to be similar and both are markedly different from the growth factor of cattle, which provides the foundation of knowledge accumulated in 35 years of work on this hormone.

Dr. Li suggested the big difference may explain why the cattle growth hormone, although it readily stimulates growth in rats, has not been consistently effective in humans.

The scientist reported that monkey and human growth hormones appear to be about half the size of the cattle hormone, a molecular weight of about 27,000 against 46,000, with about 240 amino acids instead of the 400 in the cattle factor.

Also the cattle hormone molecule has a cumbersome Y structure, with two N-terminals and one C-terminal amino acids, while the human and monkey hormones have the much simpler straight chain amino acid structures, with a single terminal amino acid phenylalanine on each end.

Dr. Li said the monkey hormone is now being tested at the National Cancer Institute to see whether it works in man. Efforts to use the cattle hormone in humans to treat dwarfism have not been successful.

He said the biological activities of the large hormones may lie in "cores" of the hormone molecules. The "core" that stimulates growth in the human, monkey and cattle hormone may be a small molecular segment that is identical in each hormone.

The rat, Dr. Li speculated, may be capable of degrading the cattle hormone and using the "core," while man may not have this ability.

The scientist said human and monkey hormone had been tested in rats and found to be equally as effective as cattle hormone. In view of the difference in size of the hormones, this would seem to support the "core" idea.

Dr. Li said the new research was made possible by the recent development of polio vaccine and of surgical operations to remove the human pituitary. Eli Lilly & Co., a maker of polio vaccine, supplied pituitaries from monkeys used in making the vaccine. Drs. Rolf Luft and Herbert Olivecrona of the Karolinska Institut, Stockholm, Sweden,

pioneers in the human pituitary operation, provided a dozen human glands for the extraction of human hormone.

From the human glands only a minute amount of hormone was obtained, 29 milligrams in the form of a white powder. There was just enough to test its activity in rats and obtain its molecular weight and something about its structure.

Future work, says Dr. Li, depends upon getting larger quantities of human and monkey glands. The scientist wants to determine for certain whether monkey and human growth hormone are identical. After that, the job would be to learn how to degrade cattle hormone and obtain the active "core" which then might be active in man.

There is little possibility that enough monkey hormone could ever be obtained for widespread use in treatment of disease, but the cattle hormone could be obtained in fairly large quantities.

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## PHYSICS

## Low Temperature "Brains"

► ELECTRONIC "BRAINS" that work in the very frigid region near absolute zero, or close to 459 degrees below zero Fahrenheit, are foreseen through the use of cryotrons.

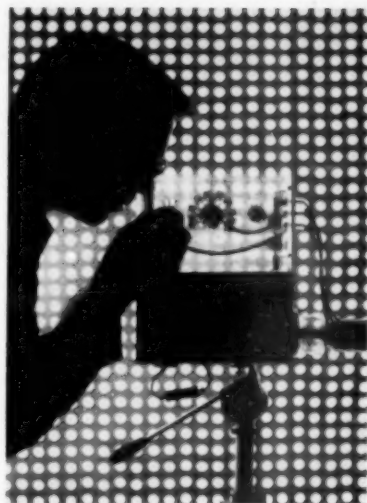
They would no longer be called "giant," because a large-scale computer might well occupy only about one cubic foot, not including the refrigerating and answer-printing equipment. Present-day computers using vacuum tubes occupy about 300 times this space.

A cryotron operated at very low temperatures serves as a nearly perfect electronic switch, scientists at Arthur D. Little, Inc., Cambridge, Mass., report.

In its simplest form, the cryotron consists of a straight piece of wire about a tenth of an inch long, wound with a control wire about the size of human hair. It operates in a bath of liquid helium at only a few degrees above absolute zero.

At such low temperatures, many metals are superconducting, offering so little resistance to the passage of electrical currents that, once the current is started, it appears to continue indefinitely. The superconductor's normal resistance returns, however, if sufficient magnetic field is applied.

When the cryotron is cooled by liquid helium, the central wire can be made superconducting or resisting by raising or lowering the magnetic field created by the



**SENSITIVE "EYE"**—A test pattern background silhouettes the Ebicon, from the phrase, electron bombardment induced conductivity, a new type television camera tube being developed at Westinghouse Research Laboratories.

control current flowing in the surrounding coil. Thus it makes, breaks or changes connections in an electrical circuit as does any electronic switch.

The cryotron can also control a larger current than is needed to actuate it. Great numbers of cryotrons can be interconnected to form the logical network of an electronic computer, as is done with vacuum tubes and transistors.

Not only would space be saved using the new devices, the A. D. Little scientists report, but considerably less power would be needed. The power saving would come from a very large reduction in the amount of current required to warm up the machine, and elimination of the need for the cooling system essential in operating a vacuum-tube computer.

An adequate supply of liquid helium can be stored easily, compactly and safely. With suitable refrigerating equipment, the helium would not have to be replenished frequently.

The A. D. Little scientists foresee the early use of cryotrons as the "memory" of a computer, and possibly as an automatic dictionary for literal translation of foreign words and phrases.

Although the cryotron's operating speed is now slow, they forecast a hundredfold increase by further research.

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## MEDICINE

# Fat Molecules Not Key

► HOPE that the measurement of certain large fat molecules in the blood would detect a tendency to heart disease in well persons has failed, in the light of experiments reported to the American Heart Association meeting in Cincinnati.

The current experiments involving a four-year study of more than 2,000 persons by scientists at Harvard School of Public Health were reported by Dr. George V. Mann.

The earlier findings, reported nearly a decade ago, were hailed at that time by some who thought the measurement of the large fat molecules, called lipoproteins, would give a means of diagnosing coronary artery hardening before a heart attack.

Countless well persons went on a low-cholesterol diet as a result of the earlier findings.

The idea was to avoid the heart attack apparently forecast by the large protein molecule measurements of their blood. Many of the large protein molecules contain cholesterol, a constituent of all animal fats and oils.

The Harvard scientists measured both cholesterol and the suspect lipoproteins in the blood of nearly 2,000 well men and women and nearly 300 patients with established coronary heart disease.

Each of the measurements showed great variability within each age and sex group. In 273 men who had survived a heart attack, cholesterol and lipoprotein levels were

higher, on an average, than in well men. Cholesterol levels were a somewhat better index of the presence of coronary artery disease, especially in younger men, the Harvard group found, than the lipoprotein measurements.

Both measurements showed poorer differentiation between sick and well people as age levels rose, Dr. Mann reported.

Both were found to be related to body weight, with obese people of either sex tending to have higher cholesterol and lipoprotein levels than thin people. The data suggest that the increase of lipid levels with age may be the result of getting fatter. This in turn implies that the increase of coronary heart disease with age may be in part a consequence of this fattening.

Since cholesterol and lipoprotein levels were elevated in persons with heart disease, the disease is undoubtedly associated with some disorder of fat metabolism. However, both cholesterol and lipoprotein levels were higher, so that measurement of cholesterol alone would serve at least as well as measurement of lipoproteins in studying this disorder. This is of practical importance, Dr. Mann said, because the lipoprotein measurements are both technically more difficult and very expensive.

"The lipoprotein measurements were not found to have the unique diagnostic value which has been claimed for them," he concluded.

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## MEDICINE

# Attack Cancer by Glands

► PARTIAL SUCCESS in attacking cancer through various glands of the body was reported at the American Cancer Society meeting in New York.

About 30% of the patients with breast cancer that had spread through the body have had the secondary cancers checked through removal of both adrenal glands and ovaries, Sir Stanford Cade of Westminster Hospital and Medical School, London, Eng., reported. The cancers checked were in bones, internal organs and skin.

More than half, 55% of the patients previously bedridden and severely incapacitated were able to return to a "near normal life," and those with cancers that had spread to bones had complete pain relief.

The patients dependent on adrenal hormones after their glands were removed survived from six months to three years.

No other method of treatment, with the exception of removal of the pituitary gland, has given similar results, Sir Stanford said.

All the patients had previously had other forms of treatment without success. Only

seven of the 135 patients died as a result of the operation, and this mortality has been falling, with only three deaths in the last 70 patients.

Cutting out various body glands to control cancer has "distracted interest" from the use of female hormones, yet this method brings favorable results in women past the menopause, Dr. B. J. Kennedy of the University of Minnesota Medical School, Minneapolis, reported.

A male hormone compound, he also reported, has caused regression of the cancer in 10 of 36 patients with advanced breast cancer.

Non-hormone chemicals, such as Amphiphenone, which can suppress function of the adrenal glands, may be the answer to this attack on cancer, Dr. Roy Hertz of the National Cancer Institute, Bethesda, Md., suggested. Such treatment would avoid the need to operate and cut out the glands. Amphiphenone itself has toxic side-effects that limit its usefulness as treatment, but less toxic related chemicals may be produced.

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## MEDICINE

# Corn Oil Cuts Down Cholesterol in Blood

► CORN OIL substituted for butter and other animal fats might be the way to keep cholesterol from accumulating in excessive amounts in the blood. Excess of this fatty chemical is believed involved in artery damage leading to heart disease.

The corn oil instead of animal fats idea comes from experiments reported to the Royal College of Physicians and Surgeons of Canada meeting in Toronto.

The experiments, in which over 100 medical students ate a basic diet with variations in the fats, were reported by Drs. J. M. R. Beveridge, Walter Ford Connell and G. A. Mayer of Kingston, Ont.

When corn oil furnished from one-fifth to six-tenths of the calories in the diet, cholesterol in the blood serum was reduced. When the diets were high in butter, beef dripping, chicken fat or lard, cholesterol in the blood increased.

Even after cholesterol had been decreased in the blood by a diet without any fat, adding corn oil further decreased the level of cholesterol.

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## MEDICINE

# Pituitary Plays Part In Breast Cancer

► A "NEAR CAUSE" of breast cancer may be the sustained stimulation of the breast by hormones from the pituitary gland in the head, Dr. Jacob Furth of Children's Cancer Research Foundation, Harvard Medical School, Boston, reported at the American Cancer Society meeting in New York.

"The pituitary," he explained, "is a mosaic of several differentiated cells with well-defined functions. It has been possible to develop tumorous masses of specific cell types of the pituitary by sustained stimulation. Growth persists as long as the stimulus is maintained."

Three types of functional pituitary gland tumors have been established. One influences the thyroid gland, another the breast, or mammary gland, and the third the adrenal glands.

The thyroid-influencing pituitary tumors are brought on and maintained by deficiency of thyroid hormone. The mammary-gland-influencing tumors are brought on and maintained by continuous excess of estrogen, or female hormone.

The pituitary gland tumor that is functioning and producing its special hormone can in turn give rise to tumors in the target organ. Sustained stimulation of the thyroid by thyroid-influencing pituitary tumors leads to thyroid tumors. The same happens in the case of breast tumors, or cancers, Dr. Furth thinks, with estrogens exerting their stimulating effect on the pituitary gland cells that influence the breast.

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**UNIFORM FOR STRATOSPHERE**—Dressed in protective clothing for the extreme temperatures encountered during a manned flight to the stratosphere are Lt. Comdr. M. L. Lewis, U.S.N., left, and M. D. Ross. Under the Office of Naval Research Stratolab program, a laboratory in the stratosphere is provided for observers to perform research that cannot be done by other means. The men are seated in a fibreglass basket that attaches to a plastic balloon for the high altitude flights.

## SURGERY

## Coronary Heart Attack

► AN OPERATION to help 10% to 20% of the victims of a coronary heart attack, such as President Eisenhower suffered last year, was announced by Dr. Alan Thal of Minneapolis at the American Heart Association meeting in Cincinnati.

The operation detours blood around a clot in the coronary, or heart, artery. Such a clot stopping the blood supply to part of the heart muscle can cause the familiar heart attack. The operation offers a new approach to the problem of getting more blood to the affected part of the heart muscle.

To by-pass the blocked segment of the artery, Dr. Thal grafts an artery from another part of the chest. So far he has performed the operation only on dogs. Studies six and seven months after the operation show about half of the arterial detours still open.

If such operations become feasible in humans, they will succeed only, Dr. Thal stressed, if the obstruction in the coronary artery is confined to a single short segment and the rest of the coronary network is healthy.

This is probably the situation in about 10% to 20% of human cases of coronary heart disease.

In other cases the coronary shutdown is associated with generalized hardening of the arteries. This would rule out benefit from the by-pass grafting.

In an effort to develop an alternative route to the heart for supplies of oxygen and food carried by the blood, Dr. Thal tried embedding one of the body's numerous rib muscles, together with its extensive capillary network, in the big pumping muscle of the heart.

Preliminary findings in dogs, he reported, show that the small vessels of the two cut surfaces readily link up with each other, opening many new channels for nourishing the heart.

To make the operations feasible for humans, the surgeons must be able to locate exactly where in the coronary system the obstructing clot occurred. Dr. Thal described a technique for getting X-ray pictures of the heart's arteries with fine enough detail to make this possible.

Science News Letter, November 10, 1956

An *International Cloud Atlas* will soon be published in two volumes, one having some 200 pages of text and the other 247 photos.

A low-cost AM radio receiver, which by the flick of a switch becomes an automatic air attack warning device, is now available.

*Silicosis*, a lung disease caused by inhalation of silicate or quartz dust, continues to be a significant health problem.

## ENDOCRINOLOGY

## Tell Early Pregnancy By Hormone Pills

► PREGNANCY can be diagnosed as early as the first week after a woman suspects she is pregnant by a simple test made with hormone pills.

The test was accurate in every one of 62 cases of pregnancy. It ruled out pregnancy in every one of 32 women, Dr. G. Douglas Matthew of the University of Edinburgh, Scotland, reports in the *British Medical Journal* (Oct. 27).

On each of two days the woman being tested takes five tablets, or pills, containing two female hormones, progesterone and estrogen. If bleeding follows, she is not pregnant. In the 32 found non-pregnant by the test, the bleeding occurred in 21 within one week.

Science News Letter, November 10, 1956

## CARDIOLOGY

## Heat, Humidity Make Heart Work Harder

► SCIENTIFIC EVIDENCE that heat and humidity make even healthy hearts work harder was presented by Drs. George E. Burch and Albert Hyman of New Orleans at the American Heart Association meeting in Cincinnati.

The added burden to a sick heart may be serious, they pointed out.

Healthy hearts, however, work harder as heat and humidity increase, showing their inherently greater capacity.

In the tests three healthy persons and four with mild to moderate heart disease rested on comfortable beds while temperature and humidity were gradually changed from 73 degrees Fahrenheit and 60% relative humidity to 111 degrees Fahrenheit and 86% relative humidity.

In every one of the seven, the volume of blood pumped by the heart and the output per heart beat increased as the atmosphere got hot and humid.

The increases in the healthy persons ranged from about five to 20 liters per minute. In those with heart disease the increase ranged from five to ten liters.

One of the healthy men had a relatively small increase that may have been the result of acclimatization, since he worked in a boiler room that was even hotter than the experimental room.

A person lying flat in bed can increase his heart's work without exercise and without movement if atmospheric conditions change, the doctors said.

"Relatively mild exercise in a hot and humid environment would be expected, from these studies, to produce more cardiac work than strenuous exercise in a cool and dry environment," they said. "A balmy climate, with adequate consideration of physical exertion and air-conditioning, appears to be most conducive to cardiac rest."

Science News Letter, November 10, 1956

## ANIMAL PHYSIOLOGY

**Empty Plate Makes Heart React Same as Full One**

► AN EMPTY PLATE will produce the same reaction in a dog's heart as a full plate of food.

Just walking to the food cupboard will sometimes do the same thing.

When a dog is used to a treadmill in the laboratory, just showing him the treadmill switch will produce the same amount of heart effort, temporarily, as working on the treadmill.

These findings, indicating the nervous system appears to be the principal factor in controlling the heart, were reported by Dr. Robert Rushmer of the University of Washington, Seattle, at the American Heart Association meeting in Cincinnati.

Contrary to the general belief that under stress the heart enlarges to increase capacity, dogs' hearts often get smaller while exercising, Dr. Rushmer found.

The findings come from studies made with apparatus consisting of two tiny sonar buttons about the size of an aspirin tablet. They are fastened to the surface of a heart chamber.

One button sends sound impulses 2,500 times a second, the other receives them. Diameter of the heart chamber is measured by travel time of the sound. In addition, a tiny pressure gauge is inserted in the apex of the heart. Fine wires are led from the three instruments to a short terminal an inch or two above the dog's shoulder.

The instruments are affixed by Seattle heart-surgery specialists cooperating in the project. They believe the presence of the tiny instruments has little effect on heart function, and does not interfere with the dog's leading an entirely normal life.

During the studies, the short terminal wires are fastened to laboratory measuring instruments. The dog may be observed at rest, exercising on a treadmill, during excitement, or while eating.

Science News Letter, November 10, 1956

## PUBLIC HEALTH

**Antibiotic Checks Tropical Dysentery**

► FOR ANY MAJOR WAR in tropical countries, scientists have a new medical weapon, it appears from a report at the American Society of Tropical Medicine and Hygiene meeting in New Orleans.

The weapon is one of the newer antibiotics, puromycin. It can suppress and prevent infections by several types of intestinal parasites, such as those causing amebic dysentery.

This was found in preliminary trials by Drs. Martin D. Young and Geoffrey M. Jeffery of the National Institute of Allergy and Infectious Diseases, stationed at Columbia, S. C., and Dr. Joe E. Freed of the South Carolina State Hospital at Columbia.

Modern drugs have not been as effective against the protozoan parasites as against bacteria.

Recently, however, puromycin was shown to remove protozoa from the intestines when given as a treatment. The question remained whether it would also be effective as a suppressive medicine.

Patients with various intestinal parasites representing naturally occurring infections participated in the research. In a typical study involving all patients in one ward, 16 of these inmates did not receive puromycin and served as controls, while 37 other patients were given treatment doses of the drug for four days.

Nineteen of these were then put on a six-week suppressive regime, and received half the dose three times each week for six weeks, while 18 were given only the initial treatment dosage.

At the end of six weeks, those receiving the suppressive drug had no protozoa, while those not receiving the suppressive had acquired three infections.

In patients receiving no puromycin, seven of 21 original protozoal infections were lost but 16 new ones were gained, showing that transmission of infection was occurring among those patients, although suppressive doses of the drug protected their associates.

Science News Letter, November 10, 1956

## BACTERIOLOGY

**In-Between Disease Germs Purified**

► ONE OF A STRANGE GROUP of disease organisms that have some characteristics like viruses and some like bacteria has been purified by Dr. T. T. Crocker of the University of California Medical Center.

The disease agent causes lung and central nervous system infection in mice, but apparently not in man. Its purification will advance studies of the new group of in-between family disease organisms that infect mice, cats, calves, sheep, parrots and other birds.

Scientists hope studies of these meningo-pneumonitis (P-VL) organisms will eventually provide clues for more effective agents against virus diseases in man.

One advantage to using P-VL organisms for studies lies in the fact that they are susceptible to antibiotics, whereas viruses are not. Accidental infection of laboratory workers, therefore, makes them less dangerous to work with than many viruses.

The P-VL organisms are almost as small as true viruses. They multiply only in a living cell, like viruses, but, when viewed in the electron microscope, they look more like bacteria.

Dr. Crocker cultured the P-VL agent in fertilized chicken eggs. His chief aid in purifying the agent was a detergent, which destroyed cellular material in which the organism grew.

Science News Letter, November 10, 1956

**IN SCIENCE**

## MEDICINE

**Anti-Cancer Drug Target Seen in Hormone Activity**

► A TARGET for anti-cancer drugs and two potential ones have been found through discovery of an enzyme-binding action of female hormones, reported by Dr. Claude A. Villee of Harvard Medical School, Boston, at the American Cancer Society meeting in New York.

Extremely tiny traces of four forms of the estrogens, or female hormones, activate one of the cell's most vital chemical catalysts, Dr. Villee found. The catalyst, or enzyme, is isocitric dehydrogenase. Activation of the enzyme has the effect of starting the cell's building machinery through which more cells are made.

As the American Cancer Society reports it, "estrogen awakens the sleeping enzyme by binding tightly with it."

If the binding could be prevented, presumably the enzyme would not be active and building of cells, including cancer cells, would not go on. The enzyme-hormone binding thus becomes a target for anti-cancer drugs.

A counterfeit estrogen that strongly inhibits activation of the enzyme and another one that weakly inhibits it have been found, Dr. Villee reported.

Whether these will prove promising enough and non-toxic enough to test against human cancers will not be known until they have been tried in tissues grown in laboratory dishes and in laboratory animals.

Science News Letter, November 10, 1956

## PUBLIC HEALTH

**New Curbs on Food Crop Insecticides**

► TIGHTER CONTROLS on the safety of food crops treated with organic phosphate insecticides are announced by the U. S. Food and Drug Administration.

In the future these insecticides, which are related to the nerve gases, will have to be tested for potentiation. This is an increase of toxicity which occurs when some of the compounds are used together.

FDA explains it takes 50 parts per million of EPN in the diet of dogs to produce a noticeable effect and it takes 250 parts per million of malathion to produce a noticeable effect. However, when only 20 parts per million of EPN and 100 parts per million of malathion are fed simultaneously, the combination is quite poisonous to the test animal.

The potentiating action of EPN and malathion for each other was discovered by FDA scientists.

Science News Letter, November 10, 1956



# E FIELDS

## AGRICULTURE

### Wild Cotton Strain Promises Dirt-Free Crop

► A WILD, LINTLESS STRAIN of cotton now seems to have provided breeders with a needed gene for breeding cotton varieties with such smooth leaves and stems that all trash is easily removed from the lint even though the cotton is machine-picked, as about 25% of today's cotton is.

Dr. J. R. Meyer, geneticist of the U. S. Agricultural Research Service, and scientists at Mississippi Agricultural Experiment Station are cooperating in developing an experimental hybrid variety of cotton that, for all practical purposes, seems to be free of leaf stem and bract hairs.

Crossing and re-crossing the wild smooth-leaf variety with an upland commercial hairy-leaf variety, they have bred a new variety that apparently has no undesirable characteristics genetically linked to the new quality of leaf-smoothness.

Rushing the project as much as possible, two generations of hybrid plants are produced each year, one crop being grown in the United States and another during the hot months in Mexico.

Science News Letter, November 10, 1956

## MEDICINE

### Pills for Diabetes Are Still Promising

► THE HOPE that many diabetics can take a pill instead of insulin injections, or "shots," continues even though use of one has been stopped by the company that introduced it into the United States.

Large scale trials of another, similar medicine for diabetics to take by mouth is continuing, SCIENCE SERVICE has learned.

The one that is being continued, because no serious reactions have been reported in its trial so far on over 10,000 patients, is talbutamide, which Upjohn Company of Kalamazoo, Mich., has trade-named Orinase.

The one on which clinical trials have been "suspended" is carbutamide, or BZ-55, introduced by Eli Lilly and Company, Indianapolis, the firm that produced the first commercial insulin preparation for diabetics in January, 1923.

Clinical trials of carbutamide, which have been going on in more than 10,000 patients, have been suspended because of a few serious side reactions in five percent of the patients. These side reactions are described as "identical to those experienced with other sulfa drugs."

Carbutamide and Orinase have both been described in general terms as "sulfa drugs."

Orinase, however, is not really a sulfa drug and should be called a tosylurea. It cannot be measured in body fluids by methods used to measure other sulfa drugs. It differs, also, in that it does not depress the thyroid gland in animals.

Its usefulness is limited to those whose diabetes has started after age 20, and chiefly to those whose diabetes started after age 40.

While trials with Orinase continue, Eli Lilly expects to continue its search for a better drug for diabetics to take by mouth and already has other compounds under study that may offer more promise than the drug it is abandoning.

Discontinuing use of carbutamide involves no danger to the 10,000 patients who have been controlling their diabetes with it. They may safely return to their former method of control.

Science News Letter, November 10, 1956

## FORESTRY

### Douglas Fir Becoming German Timber Tree

► WEST GERMANY is adopting Oregon's Douglas fir as a primary timber tree in its extensive state forests.

"West Germany is in the market for all the Douglas fir seed she can buy," Wolfgang Koehler, forestry attaché at the German Embassy, reported after a visit to Oregon's Douglas fir forests.

"Seed is bought and grown by private nurseries, which sell the seedlings to state forests. The biggest German nursery is far bigger than any in the United States."

Germany now imports about 25,000 pounds of fir seed annually. Douglas fir seed at \$12 per pound is so expensive that it is planted sparsely in stands of Scotch spruce and pruned by hand to produce clear lumber.

German lumber production is small in volume, but West Germany devotes as high a percentage of its arable lands to forests as the United States.

Mr. Koehler's primary job is to inspect sources of seed for purchase by German firms to certify quality and type of seed. Seed from various altitudes and localities is being tested in German research projects.

Science News Letter, November 10, 1956

## GEOPHYSICS

### Undreamed Discoveries Predicted Before 1958

► DISCOVERIES not now dreamed of may result from rocket probes of the earth's atmosphere during the International Geophysical Year, Dr. Joseph Kaplan, chairman of the U. S. National Committee for IGY, predicted in Fort Churchill, Canada.

The cash value of these discoveries cannot be estimated, he said, but the knowledge gained in the world-wide scientific investigation of the planet earth will give man a better control over his environment.

Science News Letter, November 10, 1956

## GEOPHYSICS

### H-Bomb Reactions Occur High in Atmosphere

► H-BOMB REACTIONS occur high in the earth's atmosphere at the time of northern lights or auroras. The reactions are not caused by fallout from hydrogen bomb tests but by tiny charged particles hurled earthward by the sun.

Studying the high level thermonuclear reactions would be a new method for learning about auroras, Dr. S. F. Singer of the University of Maryland suggests. He reports plans to use, about the first of next year, an especially equipped airplane flying near 50,000 feet to try to detect the solar-caused effects.

An earth-circling satellite coated with one of the light elements could also be used to spot the effects, Dr. Singer says.

He believes the "most important" of the reactions is the capture of protons by nitrogen in the upper atmosphere, releasing large amounts of energy.

Very high speed particles, particularly protons, thrown out by the sun cause a "relatively small" number of thermonuclear reactions, he proposes. They also are believed to cause the shimmering displays of auroral color and ionization of the atmosphere at high altitudes.

Penetrating gamma rays produced by the capture of protons by nitrogen indicate the nature and energy of the incoming particles.

These nuclear effects must be considered in designing space satellites, Dr. Singer says. If gamma ray production is undesirable, the satellite's surface should be coated with an element of relatively high atomic number.

On the other hand, by using two Geiger counters, one coated with one of the light elements and the other uncoated, detectors for solar protons of the desired energy can be constructed, even though low-energy protons alone could not penetrate the skin.

Science News Letter, November 10, 1956

## MEDICINE

### Four "Blue Babies" Now Are Mothers

► THE FOURTH CASE on record of a woman who was a "blue baby" now having achieved motherhood was reported by Drs. Jack M. Kaufman and Paul Ruble of Detroit at the American Heart Association meeting in Cincinnati.

Before "blue baby" operations became available in 1945, children with congenital heart defects could expect to live a dozen or score of years at most. Now they are living to the age when they can marry and begin raising families of their own.

"Women with heart disease can safely become pregnant," the doctors said. "There is no cardiac indication for abortion. Heart surgery if necessary may be performed quite safely during pregnancy."

Science News Letter, November 10, 1956

## TECHNOLOGY

# India's Atomic Future

With the world's largest known deposits of thorium, India is staking her atomic future on this radioactive element, discovered by a German chemist on rope shipped from India.

By **BARBARA TUFTY**

Science Service Correspondent

► **THE HEAVY BLACK SANDS** along the southwest coast of India contain the world's largest known supply of thorium, nuclear fuel for industrial power.

Thorium, a radioactive element, is found there chemically bound to monazite, a phosphate of the group of elements known as rare earths. About one and a half million tons of monazite sands lie along the Travancore coast line, according to estimates by scientists at the Indian Rare Earths Limited. Indian monazite is especially rich in thorium, containing from eight to ten and a half percent.

Thorium ore has been found in Brazil, Indonesia, Malay, Florida, and in some parts of Russia, but the richest deposit lies on the coconut-fringed beach of India, about nine degrees north of the equator.

Along the narrow, hundred-mile strip of beach that stretches from Cape Comorin to north of Quilon, curious combinations of nature have worked for thousands of years to heap up the unusual supply of monazite sands.

Washed down from the crumbling Western Ghats by torrential monsoon rains, rich rare-earth minerals have gradually been carried westward towards the Arabian Sea. High specific gravity of these minerals causes them to sink quickly to the bottom, while lighter materials are borne away.

Considerable deposits of heavy mineral sands have in this way slowly moved onto the lower beaches of the country.

## Thrown Back on Beach

Under usual conditions of erosion they would be washed into the ocean and lost, but here unusual sea currents, sand-bar formations, and the yearly violent monsoon all combine to throw back the heavy sand grains. During the hot tranquil months of summer, silica grains make the beach blinding white under the sun. During the stormy monsoon months, however, southwestern winds whip the sea into churning waves that carry away lighter silica sands and heave black minerals back onto the low dunes.

It only remains for man to dig this sand during the monsoons and separate it into its various components.

The main constituent of the black sand is ilmenite, a compound of iron and titanium oxides. Monazite, source of thorium, forms about three percent of the Travancore beach sand. Other minerals include

rutile, zircon, and also sillimanite, garnet and quartz.

First stage in separating sands for nuclear fuel begins at the beach near Chawara, Quilon, where Indian factories separate thorium-bearing monazite from ilmenite by vibrating screens and electromagnetic separators.

From there, the now green-golden monazite sands, packed in gunny sacks, are poled in flat country boats along the Periyar River and shallow back waters to the Rare Earths factory at Alwaye about 30 miles to the north, where the second step for nuclear power takes place.

There, in modern gray and white buildings on a 24-acre site, more than 1,500 tons of monazite sands are treated chemically each year to produce rare earth compounds, shining white trisodium phosphate and the thorium residue, a light tan mud.

Alwaye officials estimate that the factory could treat well over 2,500 tons of monazite a year by working double shifts.

Most important to India's nuclear energy program is the residue thorium hydroxide,

containing about nine percent thorium and a fraction of one percent uranium. This residue is shipped to Trombay, near Bombay, to produce thorium and uranium compounds and metals for use in atomic reactors and industry.

India will probably rely chiefly upon thorium for her future nuclear power, Indian scientists predict.

## Thorium Must Be Converted

Although thorium is radioactive, it is not naturally fissionable. It can be converted into U-233 which is fissionable. This is done in a breeder reactor where a core of U-235 sends out neutrons into a surrounding blanket of thorium and turns it into U-233, fissionable material for generating power.

This is the most likely process by which India will use her plentiful supply of thorium in her reactors.

The Indian Rare Earths Limited was set up in 1950, following the passage of the Government of India's Atomic Energy Act in 1948, and the establishment of an Atomic Energy Commission with Dr. Homi J. Bhabha as chairman. Dr. Bhabha, one of the world's foremost physicists, was chairman of the 82-nation Atoms-for-Peace Conference held at Geneva in 1955.



**ANCIENTS AND ATOMICS**—An Indian riverboat in Travancore-Cochin is hand-powered past India's new rare earths factory, which is geared for the atom-powered future. Rich in thorium, India is scooping the radioactive element from her beach sands and processing it in this factory.

India's valuable monazite deposits were discovered unexpectedly about 50 years ago by a chemist in a warehouse in Germany. In the early years of this century, coir, or rope, spinners were carrying on a lively trade with Europe, especially Germany. As coir spinners sat on the Travancore beach to twist their coconut-husk rope, heavy wet sand grains became entrined. Much of this sand fell off on the voyage, but some stuck long enough to reach the coir store-rooms of Germany. In 1909 a German chemist chanced to analyze the yellow-green sands and found high quantities of monazite.

From then on, the beaches of Travancore were sifted, agitated, separated and exported without restriction until 1947 when a small group of scientists approached the president of the Indian Science Congress and convinced him to halt the foreign development of India's valuable minerals.

That president was Jawaharlal Nehru, and today the industry is under control of the Government of India, performing an important part in India's declaration of economic independence.

Science News Letter, November 10, 1956

#### CHEMISTRY

### Safe Substitute for Carbon Tetrachloride

▶ A SAFE SUBSTITUTE is a cleaning fluid for dangerous carbon tetrachloride exists in a little known solvent material, methyl chloroform.

It is much less likely to injure the user in almost every application where hand cleaning is done at room temperature, a committee of the American Industrial Hygiene Association in Detroit reported.

General ventilation is considered enough for brief exposures or those from use of very small quantities of the solvent. High temperatures or prolonged exposures will require process ventilation.

Recommended maximum atmospheric concentration (eight hours) for methyl chloroform is 500 parts of vapor per million parts of air (ppm) by volume, while that for carbon tetrachloride is 25 ppm, the industrial hygienists state.

A comparison of the two solvents shows their great similarity for cleaning purposes.

Science News Letter, November 10, 1956

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Science News Letter, November 10, 1956

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—VICTOR W. KILLICK, Jr., in Charge of Astronomical Observatory, Sacramento Junior College, Calif.

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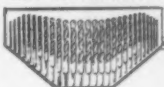
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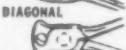
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# Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

THE ADVANCEMENT OF SCIENCE: Vol. XIII, No. 50—*British Association for the Advancement of Science*, 145 p., illus., paper, 7s 6d. Including the address of Sir Raymond Priestley "Twentieth-Century Man Against Antarctica," given at the Sheffield meeting in August.

THE CONSTITUTION OF MATTER—Robert Oppenheimer—*Oregon State System of Higher Education*, Condon Lectures, 37 p., illus., paper, \$1.00. Lectures given by the director of the

Institute for Advanced Study, Princeton, N. J., intended as an introduction for the layman to a rather unfamiliar field.

JULES VERNE—*Marguerite Allotte de la Fuye*, Translated by Erik de Mauny—*Coward-McCann*, 222 p., \$3.95. Considering Verne both as a writer and a prophet of the new scientific age.

THE KING'S DAY: A Day in the Life of an African King—Margaret Plass—*Chicago Natural History Museum*, 22 p., 10 plates, paper, 35 cents. Based on the exhibits in the Cameroons King's House of the Museum.

MY EXPERIMENTS WITH VOLCANOES—Thomas A. Jaggar—*Hawaiian Volcano Research Association (Bishop Museum)*, 198 p., illus., \$4.00. The author, famous volcanologist, spent the last years of his life writing this history of his 60 years of intensive, rugged and hazardous scientific achievements, which included experiments on the active Hawaiian volcano, Kilauea.

SCIENCE CLUBS OF AMERICA SPONSOR HANDBOOK—Margaret E. Patterson, Ed.—*Science Service*, 1957 ed., 64 p., illus., paper, \$1.00. Useful information for science clubs. A new feature is the index to "Free and Low Cost Materials."

THE WONDERFUL WORLD OF ARCHAEOLOGY—Ronald Jessup—*Garden City Books*, 69 p., illus., \$2.95. Telling for children, the story of archaeological finds around the world and under the seas.

Science News Letter, November 10, 1956

## 133 PIECE SURPLUS POWER TOOL SET \$2

Brand New—U. S. Gov't Surplus  
Once in a Lifetime Bargain on Power  
Tool Accessory Set.

Guaranteed \$11.00 Retail Value—  
Now Yours for only \$2.00.

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Because of the large number of tools we must ask for 25c for postage and handling on all one set orders. We absorb these costs on 2 or 3 tool set orders.

You will receive our money if I am not satisfied.

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## 16-Year-Old Boy Designs Computer

A sixteen-year-old Pittsburgh boy has designed a special computer that composes musical tunes. Making use of a GENIAC electric brain construction kit and his own stochastic analysis of frequency of certain notes in simple melodies, he was able to devise a method for generating new melodic elements which retained a likeness to common patterns while sounding different.

The new design, stimulated by the annual contest sponsored by Oliver Garfield Co., originators of the GENIAC kit, has demonstrated in a striking fashion the utility of GENIACS in encouraging thinking about computers. At the present time hundreds of schools and colleges have introduced GENIACS into their curricula to extend their pupils knowledge of computer circuitry.

Since so much of contemporary computer circuitry makes use of relatively simple electrical ideas which are recombined into a variety of intricate networks, it has been possible to present over forty basic computer circuits which can be built with the specially designed multi-deck switches of the GENIAC kit. The completed machines are all powered by one flashlight battery.

GENIAC circuits are ingenious, frequently requiring Game theory for their conception but are simply constructed. The machines encompass Tic Tac Toe and Nim, analyze actuarial problems, reason in syllogisms, test your intelligence, and generally start youngsters and adults thinking in terms of problem-solving equipment.

The components are so versatile that larger industrial firms buy them as supplementary desk calculators for solving recombination problems and exercises in symbolic logic.

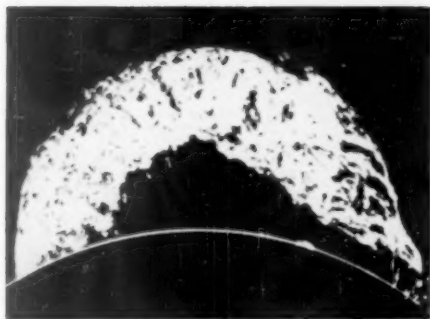
The entire kit, consisting of over four hundred parts and components plus a complete course (with seven manuals) in basic circuit design, is available directly from the manufacturers, Oliver Garfield Company, Department SL 56, 126 Lexington Avenue, New York 16, N. Y. The price is \$19.95, with a seven-day return guarantee.



ON TELEVISION

NOVEMBER 19

# "Our Mr. Sun"



Pictures of natural phenomena figure prominently in "Our Mr. Sun," like this High Altitude Observatory movie of an explosion on the sun.

*The first in a series  
of TV shows about science,  
sponsored by the*

**BELL TELEPHONE SYSTEM**

Presenting scientific information with the drama, excitement and humor of popular entertainment.

The science programs have been in preparation for several years under the guidance of a distinguished scientific advisory group. They are a serious attempt to bring to the public an understanding of the meaning of science and the work of scientists, showing their part in modern life and culture and helping to inspire interest in science among young persons.

"Our Mr. Sun" is a full-hour film in color, deals with solar physics, solar astronomy and the uses of solar energy. Its accuracy and authenticity are assured by a panel of the world's leading scientists in solar studies, including Dr. Farrington Daniels, Dr. Armin Deutsch, Dr. Donald Menzel, Dr. Walter Orr Roberts and Dr. Otto Struve. Produced and directed by the Academy Award-winning director Frank Capra; animated drawings by UPA Pictures, Inc.

**Tune in this special science telecast on the CBS-TV Network, 10 to 11 P.M., E.S.T.,**

**November 19, 1956. Check local listings for time and station.**

## OPTICAL BARGAINS EXCELLENT FOR CHRISTMAS GIFTS!

### Photographers!

Adapt your camera to this Scope for excellent Telephoto shots and fascinating photos of moon!



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... with this Complete 87 Piece "Do-it-yourself" Kit  
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Get Ready to See the Artificial Satellites!

Everything you need! No machining! Easily assembled! We furnish complete, simple instructions. Kit includes: 3" f/10 aluminized and over-coated Spherical Mirror—60X Eyepiece and 100X Barlow Lens—Cross-line Finder—sturdy 40" Tripod—fork type Equatorial Mount with 1/2" on both axes—ventilated 3" Mirror Mount—heavy wall, black Telescope Tube. All nuts and bolts supplied. Nothing extra to buy. Our 3" Spherical Mirror (30" f.l.) is guaranteed to resolve detail right up to theoretical limit. Your finished scope can also be used terrestrially. Money-back guarantee. Shipping weight, 10 lbs.

FREE with Kit—Valuable STAR CHART and 136-page Book, "DISCOVER THE STARS"

Stock No. 85,025-Q ..... \$29.50 f.o.b. Barrington, N. J.



This is an actual photograph of the moon taken through our Astronomical Telescope by a 17-year-old student.

### NEW! STATIC ELECTRICITY GENERATOR



See a thrilling spark display as you set off a miniature bolt of lightning. Absolutely safe and harmless—perfect for classroom experimentation. Ideal for Science Clubs. Sturdily made—stands 14" high. Turn the handle and two 3" plastic discs rotate in opposite directions. Metal collector brushes pick up the static electricity, store it in the Leyden jar type condenser until discharged by the jumping spark. Countless tricks and experiments. 24-page instruction booklet included.

Stock No. 70,070-Q ..... \$10.95 Postpaid

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Grind Your Own Astronomical Mirror  
Complete Kits including Blank, Tool and Abrasives



All over America amateurs are grinding their own mirrors and making expensive Telescopes cheaply. You can do the same using our Kits. These contain mirror blank, tool, abrasives, diagonal mirror and eyepiece lenses. You build instruments ranging in value from \$245 to thousands of dollars.

Stock No.	Dia. Mirror	Thickness	Price
70,003-Q	4 1/2"	1 1/2"	\$ 7.20 postpaid
70,004-Q	6"	1 1/2"	11.40 postpaid
70,005-Q	8"	1 1/2"	12.70 postpaid
70,006-Q	10"	1 1/2"	29.45 postpaid
70,007-Q	12"	2 1/2"	51.45 postpaid

### INSTRUCTION BOOKLETS

Easy to follow—accurate—8 1/2 x 11 page size—many illustrations. Do-it-yourself—Save! and Have Fun!

	Stock No.	Price
How to Build Projectors	9014-Q	20¢
Homebuilt Telescopes	9008-Q	40¢
Method to Clean Precision Optics	9024-Q	15¢
Homebuilt Riflescopes	9016-Q	30¢
All About Telephoto Lenses	9036-Q	60¢
How to Condense and Project Light with Lenses	9044-Q	75¢
Reticles and Their Uses	9039-Q	45¢
ULTRA CLOSE-UP Photography	9042-Q	80¢
Infra-red Light and its Uses	9040-Q	80¢
Homemade Stereo-Adapters	9052-Q	30¢
Homemade Stereo-Viewers	9054-Q	30¢
Photo Micrography with P.s.	9029-Q	10¢
Dummy Camera	9055-Q	20¢
Collimating Systems	9047-Q	35¢
*Building a Condenser Enlarger	9038-Q	40¢
FUN WITH OPTICS—New 32 pages, Completely illustrated! Shows how to build all kinds of Telescopes, Viewers, Magnifiers, many optical instruments. Tells all about lenses and prisms. TERRIFIC!	9050-Q	50¢ postpaid

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ORDER BY STOCK NUMBER, SEND CHECK OR MONEY ORDER. SATISFACTION GUARANTEED!  
**EDMUND SCIENTIFIC CO., BARRINGTON, N. J.**

## Questions

ANIMAL PHYSIOLOGY—How does a dog's heart react to sight of an empty plate? p. 296.

□ □ □

CARDIOLOGY—What improvement has been made in obtaining records of the heart's current? p. 292.

□ □ □

ENDOCRINOLOGY—How early can pregnancy now be diagnosed? p. 295.

□ □ □

GEOPHYSICS—What is the "dawn chorus"? p. 292.

□ □ □

PHYSICS—Of what components may low temperature "brains" be built? p. 293.

□ □ □

PUBLIC HEALTH—What new weapon may be used to fight tropical dysentery? p. 296.

□ □ □

Photographs: Cover, Bell Telephone Laboratories; p. 291, United Press Photo; p. 293, Westinghouse Research Laboratories; p. 295, U. S. Navy; p. 298, Indian Rare Earths Limited; p. 303, Western Pen Co., Inc.

## Do You Know?

Human milk contains four to five times as much enzyme activity as cow's milk, which may make the milk proteins more nutritionally usable.

A new type of X-ray equipment permits a physician or hospital to offer virtually complete diagnostic medical X-ray service with an investment of less than \$5,000.

It is estimated that at least 17% of Canada's annual catch of fish and shellfish spoils before the fishing boat docks at the pier.

Packages of books have been sent by CARE to 2,181 schools, libraries, reading rooms and other institutions in 47 countries.

At current growth rates, the world's population will double in half a century, jumping from 2.7 to some 5.5 billion.

### New! 2 in 1 Combination

### Pocket-Size 50 POWER MICROSCOPE

### and 10 POWER TELESCOPE

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Useful Telescope and Microscope combined in one amazing, precision instrument. Imported! No larger than a fountain pen. Telescope is 10 Power. Microscope magnifies 50 Times. Sharp focus at any range. Handy for sports, looking at small objects, plain smelling. Send Check or M.O. Satisfaction Guaranteed

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### SPITZ MOONSCOPE

A precision-made 82 power reflecting telescope — by the makers of Spitz Planetarium. Clearly reveals the craters of the moon, shows Saturn, Jupiter, other wonders of the heavens. Based on same principles as world's giant telescopes. Stands 36" high on removable legs. Adjustable 3" polished and corrected mirror. Fork type Alt-Azimuth rotates on full 360° circle—swings to any location in the sky. Fascinating 16-page instruction book is included. Instrument packed in sturdy carrying case. Stock No. 70,068-Q ..... \$14.95 Postpaid

### SPECIAL SALE 7x50 MONOCULAR

This is fine quality, American made instrument—war surplus! Used for general observation both day and night and to take fascinating telephoto shots with your camera. Brand new. \$95 value.

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It's easy—inexpensive. We furnish instruction sheet. This sun powered furnace will generate terrific heat—produces many unusual fusing effects.

Stock No. 80,040-Q—Fresnel Lens, size 11 1/2" x 16 1/2" f.l. 19"

\$3.50 Postpaid.

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Fun for adults! Fun for children! Kits include plainly written, illustrated booklet showing how you can build lots of optical items.

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Stock No. 10-Q—80 lenses ..... \$10.00 Postpaid

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Hours, days and even months of patient waiting and stalking by top Hollywood naturalist cameramen has produced a collection of Wild Life Films so true-to-life, so magnificent in scope that they have been used by all Major Studios. Now, for the first time, they are available to all nature lovers at a fraction of their true cost... direct from the Producers! More than 100 subjects!

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# • New Machines and Gadgets •

For sources of more information on new things described, send a self-addressed stamped envelope to SCIENCE SERVICE, 1719 N St., N.W., Washington 6, D. C., and ask for Gadget Bulletin 856. To receive this Gadget Bulletin without special request each week, remit \$1.50 for one year's subscription.

✿ **SOLDERLESS WIRING DEVICES** permit faster crimping of terminals and connectors to wire ends. Terminal and connector barrels are made one-quarter inch in length to provide room for the nose of the crimping tool. The wiring devices are made in one piece, and in one type a plastic sleeve is permanently attached to prevent slippage.

Science News Letter, November 10, 1956

✿ **CONVEYOR BELTS** of plastic are strong, smooth, crackproof, non-absorbent, immune to oils and greases, and stable under humidity and temperature changes. The polyester plastic film used has a low weight of 0.04 pound per square foot, claimed to be only a twelfth as heavy as the lightest woven material.

Science News Letter, November 10, 1956

✿ **PORTABLE P.A. SYSTEM** has a transistorized power amplifier giving an output of 10 watts. A British development, the public address system weighs 24½ pounds. It can be carried in a small case and its battery is good for from 12 to 14 hours of continuous use, after which it can be recharged.

Science News Letter, November 10, 1956

✿ **WRITING OUTFIT** allows writing invisible messages that appear instantly when



wiped with a sponge soaked in fluid, as shown in the photograph. The kit contains invisible ink ball point pen, sponge and bottle of fluid.

Science News Letter, November 10, 1956

✿ **CEILING FIXTURE** is also an air conditioner. Looking just like a conventional fluorescent light fixture, the combination

unit has a built-in and concealed air diffuser. The diffuser, mounted above the reflector plate, distributes cool air that bypasses the lamps.

Science News Letter, November 10, 1956

✿ **BONDING AGENT** added to a concrete mix creates a strong bond between new and old concrete. A polyvinyl acetate concentrate, moist curing is not necessary. The bonding material can be used in mixes for surfacing and resurfacing, with mortars and plasters, with manufactured concrete products and as a cement paint additive.

Science News Letter, November 10, 1956

✿ **SEWING GUIDE** is a plastic plate that makes it possible for anyone to sew straight. With a width gauge up to two and one-half inches, the guide can be used with either right or left hand. Sewing as close as 1/32 inch to the edge is possible and the attachment fits any machine.

Science News Letter, November 10, 1956

✿ **STEERING WHEEL** for miniature cars and other toys is made of butyrate plastic like those of full-size cars. The wheel, practically unbreakable in use, is fitted with a steel core for attachment to a steering column and comes in a variety of colors.

Science News Letter, November 10, 1956



## Nature Ramblings



By HORACE LOFTIN

➤ **THE CASUAL WEEK-END DRIVER** these days may think he has wandered by mistake into an army firing range as volley after volley of gunshots blast the quiet countryside.

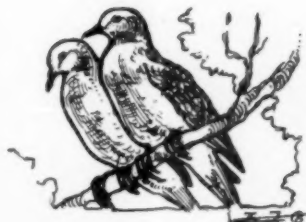
It may or may not relieve him to know that he is driving by the site of an organized hunt for mourning doves.

The usual way to hunt the elusive, fast-flying mourning dove is for a large group to surround a field planted in corn or other grain. When a flock of doves enters the field, the first hunter to see them emits a low whistle to alert his comrades. Then the shooting is on.

The object is to keep the birds flying back and forth over the field so that as many hunters as possible get a try at the shooting.

A "try" at the shooting is the proper expression, because the mourning dove presents one of the most difficult of targets, even for a shotgun. The oldest hand at

### Dove Hunt



dove hunting may shoot up a box or more of shells without getting anything like his daily game limit.

Statistics gathered in Florida show that the average take of doves per hour by hunters is only 1.7 doves. The average daily bag of doves per hunter amounts to less than four. Who could estimate the number of shells expended per hunter for these birds?

What effect does hunting pressure have on the mourning dove population? According to Frank Winston, Florida wildlife expert, under present controls the answer is a brief "none!"

Mr. Winston points out that the dove is naturally short-lived, with some 70% to 80% of the population dying from one cause or another within the first year. His figures for Florida show that only some four percent of the birds are taken by hunting. Thus, he says, that amount is insignificant compared to the dove mortality due to strictly natural causes.

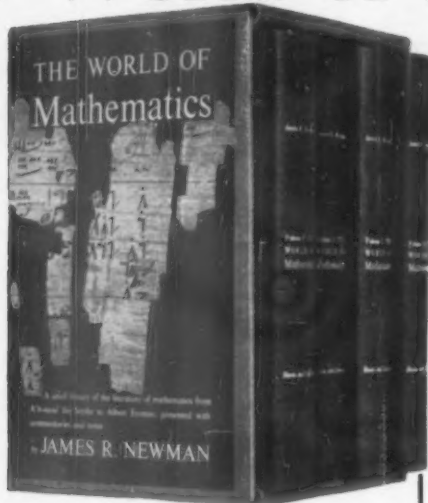
Fifty percent of the doves would die anyway during the period of the hunting season, regardless of whether any are harvested by hunters or not.

It should always be remembered that conservation means more than just hoarding of natural resources: it means best "utilization" of resources for the most people over the greatest period of time.

Science News Letter, November 10, 1956

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Over 2500 years of scientific progress reflected in 133 complete selections from the great mathematical writings of history, from the Rhind Papyrus to relativity.

With 89 interpretive essays by James R. Newman, editor, who provides the relevant cultural and biographical background for each of the selections and links them in a broad scientific perspective.

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